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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/071,471	02/08/2002	Paul A. Koning	42390P12137	9970

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02/06/2003

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EXAMINER

DUONG, THO V

ART UNIT PAPER NUMBER

3743

DATE MAILED: 02/06/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/071,471

Applicant(s)

KONING ET AL.

Examiner

Tho v Duong

Art Unit

3743

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 February 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) 4 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 and 5-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

This application contains claims directed to the following patentably distinct species of the claimed invention: the species are identified as the species of figure 4 and figure 5.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claim 1 is generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

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During a telephone conversation with Mr. Tom Van Zandt on January 16, 2003 a provisional election was made without traverse to prosecute the invention of species of figure 4, claims 1-3 and 5-25. Affirmation of this election must be made by applicant in replying to this Office action. Claim 4 is withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 5,8,10,12, 13,17- 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Regarding claims 13 and 14, the claimed subject matter of "in a range of approximately 5-100 volume% fusible" renders the scope of the claim indefinite since, this range 5-100 volume % is not supported in the disclosure. As regard claim 19, it is not clear if whether applicant claims "a non-fusible particle" is part of the thermal interface material or not.

Claim 5 recites the limitation "the thermal conductivity of the non-fusible particle filler" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 8 recites the limitation "the non-fusible particle" in line 1; and "the group" in line 2. There are insufficient antecedent bases for these limitations in the claim.

Claim 10 recites the limitation "the total filler" in line 1, and "the range" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 12 recites the limitation "the non-fusible particle filler" in line 1 and "the range" in line 1. There are insufficient antecedent bases for these limitations in the claim.

Claims 13 and 14 recite the limitation "the volume percent of fusible filler to non-fusible particle filler" in line 1. There is insufficient antecedent basis for this limitation in the claims.

Claim 17 recites the limitation "the group" in line 1. There is insufficient antecedent basis for this limitation in the claim.

Claim 18 recites the limitation "the solder" in line 1, and "the group" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 20 recites the limitation "the particle filler" in line 4. There is insufficient antecedent basis for this limitation in the claim.

Claim 21 recites the limitation "the group" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim 23 recites the limitation "the group" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claims 1-3 and 5-25 are further rejected as can be best understood by the examiner.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3 and 6-8 are rejected under 35 U.S.C. 102(b) as being anticipated by Reylek et al. (US 4,606,962). Reylek discloses (figure 3 and column 4, lines 38-45) that a thermal interface material comprising a polymer material, which acts as an adhesive (34); a silver or copper particle filler are coated with a solder material.

Claims 1-3,5-10, 15-18 and 20-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Toyota Jidosha (JP 07179832A). Toyota discloses (figures 1-3, and table 4) that a thermal interface material that has a conductive filler (2) embedded within an adhesive material (1) wherein the conductive filler comprises of a non-fusible particle of silver (20) and a solder alloy (21) coated on the particle (20). The solder alloy is selected to be a combination of Bi (57%) and Sn (43%) in order to obtain a melting temperature of 139 degrees (C). It is well known in the art that the thermal conductivity of silver is greater than the solder alloy of Bi and Sn. Toyota further discloses (paragraph 13) that the total filler (2) is in a range of approximately 70-90% weight of the thermal interface material.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-14 are rejected under 35 U.S.C. 103(a) as obvious over Toyota. Toyota substantially discloses all of applicant's claimed invention as discussed above except for the limitation regarding the physical composition of the thermal interface material. It would have been obvious to one having ordinary skill in the art at the time the invention was made to select the claimed range of physical composition between the fusible and the non-fusible particle in view of Toyota's physical composition of the fusible and non-fusible particle, since it has been held that where the general condition of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Reylek in view of Squitieri (US 4,869,954). Reylek discloses substantially all of applicant's claimed invention as discussed above except for the limitation that a diameter for a conductive filler can be approximately 25 microns. Squitieri discloses (column 4, lines 11-15) that a thermal interface material (10) having conductive fillers embedded within a binder, wherein the conductive fillers has a particle size from 1 micron to about 50 microns so as not to distort the surface of the thermally conductive material. It would have been obvious to one having ordinary skill in the art

at the time the invention was made select the conductive filler's size from 1 micron to about 50 microns so as not to distort the surface of the thermally conductive material.

Claims 24-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Toyota in view of Watari (US 4,612,601). Toyota substantially discloses all of applicant's claimed invention as discussed above except for the limitation that the thermal interface material can be used between a die and a spreader plate, and between the spread plate and a heat sink. Watari discloses (figures 1) an assembly comprising a heat sink (4,5); a spreader plate (9) a die (2); a thermal interface material is disposed between the die (2) and the spreader plate (9), and between the spreader (3) and the heat sink (4) to thermal effectively adhere the die with the spreader plate and the spreader plate with the heat sink. It would have been obvious to one having ordinary skill in the art at the time the invention was made to use Watari's teaching for Toyota's thermal interface material to thermal effectively adhere the die with the spreader plate and the spreader plate with the heat sink.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Anschel et al. (US 4,914,551) discloses an electronic package with heat spreader member.

Huang et al. (US 5,062,896) discloses a solder/polymer composite paste as a thermal interface material.

Chiu (WO 02/11504 A2) discloses a thermal interface material on a mesh carrier with soldering coated material on its outer surface.

Eizaburo (JP 02000309773A) discloses conductive adhesive comprising a binder and a conductive filler.

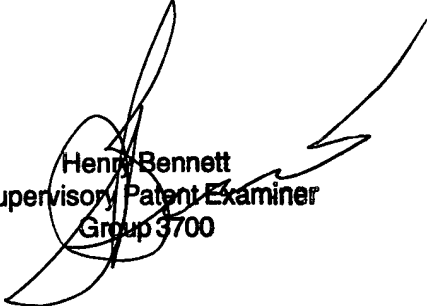
Any inquiry concerning this communication or earlier communication from the examiner should be directed to Tho Duong whose telephone number is (703) 305-0768. The examiner can normally be reached on from 9:30-6 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Bennet, can be reached on (703) 308-0101. The fax phone number for the organization where this application or proceeding is assigned is (703)308-7764.

Any inquiry of a general nature or relating to status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0861.

Tho Duong

January 20, 2003



Henry Bennett
Supervisory Patent Examiner
Group 3700